

ASX ultra high performance subwoofer

Preliminary User Guide



The Martin Experience

Contents

- 1 Unpacking & handling**
- 2 Electrical safety**
- 3 Rear connector panels**
- 4 Acoustical safety**
- 5 Introduction**
- 6 Specifications & dimensions**
- 7 System set-up with MA Control Manager**
- 8 System placement**
- 9 System time/phase alignment**
- 10 Warranties**



! READ THIS FIRST !

ASX ultra high performance active subwoofer

Important Safety Instructions

1. Read these instructions
2. Keep these instructions
3. Heed all warnings
4. Follow all instructions
5. Do not use this apparatus near water
6. Clean only with dry cloth
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding – type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus
11. Only use attachments / accessories specified by the manufacturer
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used use caution when moving the cart / apparatus combination to avoid injury from tip – over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.



ASX ultra high performance active subwoofer

Preliminary User Guide



This manual contains important information on installing and operating your ASX subwoofer correctly and safely. Please read it carefully before installing or operating the system. If in doubt, contact Martin Audio Limited. Tel: +44 (0)1494 535312. Email info@martin-audio.com

1 Unpacking & handling

Thank you

Thank you for purchasing a Martin Audio ASX ultra high power active subwoofer system.

Each Martin Audio ASX subwoofer is built to the highest standard and thoroughly inspected before it leaves the factory.

Unpacking

After unpacking the system, examine it carefully for any signs of transit damage and inform your dealer if any such damage is found.

We suggest that you retain the original packaging so that the system can be repacked at a future date if necessary.

Please note that Martin Audio and its distributors cannot accept any responsibility for damage to any returned product through the use of non-approved packaging.

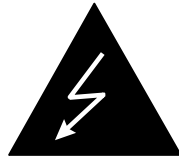
Handling





The ASX subwoofer is delivered on wheels to ease delivery to site. Pocket handles are provided for manoeuvring and final positioning.

We recommend removing the wheels and storing them in a safe place, once the ASX is installed. This will save installation space and prevent rattling.

Please ensure that the wheel fixing holes are refitted with the M8 countersunk screws provided to prevent air leakage noise.

2 Electrical safety



-  Read these instructions
-  Follow all instructions
-  Heed all warnings
-  Keep these instructions for future reference

Approvals

This equipment has been tested by a Notified Body (Directive 89/336/EEC-EMC), pursuant to the product family standard for audio professional use, and found to comply with EN55103-1, EN55103-2 (with limits for E4 and E5 electromagnetic environment) plus EN61000-3-2 and EN 61000-3-3.

This is a Class A product. In a domestic environment this product may cause radio interferences in which case the user may be required to take adequate measures.

This equipment has been tested and found to comply by Notified Body 0715 (Directive 73/23/EEC L.V) pursuant to the audio apparatus safety requirements: Standard EN 60065.



This equipment has been tested by a Notified Body (Directive 89/336/EEC-EMC), pursuant to the product family standard for audio professional use, and found to comply with EN55103-1 and EN55103-2 standard (with the limits for E1, E2 and E3 electromagnetic environment) plus EN61000-3-2, EN61000-3-3.

This equipment has been tested and found to comply by Notified Body 0715 (Directive 73/23/EEC L.V) pursuant to the audio apparatus safety requirements: Standard EN 60065.

Caution

To reduce the risk of electric shock, do not remove the cover. There are no user-serviceable parts inside the unit. Refer servicing to qualified service personnel. Call Martin Audio Limited on +44 (0)1494 535312 or email info@martin-audio.com for service advice.

Installation

This product is for permanent location and should be installed by a qualified engineer. The supply cable used should have conductors 1.5mm sq (14 AWG) or greater and must comply with local regulations

The installer must provide a means of disconnection. This could be of the form of a mains plug, an all pole mains switch, or an all pole circuit breaker. Where an all-pole mains switch or circuit breaker is used, it must have a contact separation of 3mm in each pole and must disconnect all poles simultaneously.

Safeguards

Electrical energy can perform many useful functions. This unit has been engineered and manufactured to assure your personal safety. Improper use can result in potential electrical shock or fire hazards. In order not to defeat the safeguards, observe the following instructions for installation and use.

Location

- ✚ Install the ASX powered subwoofer in a well ventilated place, where it will not be directly exposed to high temperature or humidity.
- ✚ Do not install the system in a location that is exposed to direct rays of the sun, or near to hot appliances or radiators. Excessive heat can adversely affect the operation and internal components.
- ✚ Do not install the system in areas likely to be affected by dripping or splashing liquids such as on floors likely to be washed with water or other liquids, in bar areas, in food or drink preparation areas, in dish-washing areas etc
- ✚ Do not install the ASX in dusty areas where its integral ventilation system – under the front grille - may become blocked

Safety Rules

- ✚ The ASX must be powered exclusively by an earth connected mains circuit in electrical networks compliant to the IEC 364 or similar rules. It is absolutely vital that the installer verifies this fundamental safety requirement. If you are in any doubt, get the installation checked by qualified personnel before use. This apparatus must be earthed.
- ✚ We strongly recommend that you power the ASX by a mains supply with an easily accessible on/off switch.
- ✚ Before powering the ASX, via the Neutrik “Powercon” 20A connector, make sure that the unit is supplied with the correct mains operating voltage:

100 - 240V ~ 50 - 60Hz

Martin Audio recommends the following mains supply current capability per ASX:

Mains voltage	Current reserve
230vac	5A rms
120vac	10A rms
100vac	12A rms

The ASX power section is protected by a F15A L type fuse – see caution below*

- ✚ Do not spill water or other liquids into or on the unit
- ✚ Do not use this unit if the electrical power cord is frayed or broken
- ✚ Do not remove the cover. Removing the cover will expose you to potentially dangerous voltage
- ✚ Do not place flame sources such like lighted candles on the ASX subwoofer
- ✚ Do not place drinks on the ASX subwoofer
- ✚ Do not place vessels containing liquids (e.g. flower vases) on the ASX subwoofer

To prevent electric shock or fire

- ✚ Do not expose the ASX powered subwoofer to rain or moisture
- ✚ Do not expose the system to dripping or splashing liquids and no objects filled with liquids, such as vases, shall be placed on or near the system
- ✚ Do not cover the grille – blocking the integral ventilation - with items such as drapes, tarpaulins etc

*Operational caution

Be aware that, although the ASX's internal time shaped limiters control excessive power and reduce clipping distortion, driving the system hard into limiting for extended periods of time may blow the power supply fuse.

3 Rear connector panels

Mains inlet

The ASX mains inlet at the rear is a 20A Neutrik Powercon® chassis socket. A matching 20A Neutrik Powercon® NAC3FCA 3-pole cable plug is provided with the ASX subwoofer for connection to the mains supply by a suitably qualified person. This apparatus must be earthed.



Mains inlet panel

See section 4 for electrical safety details.

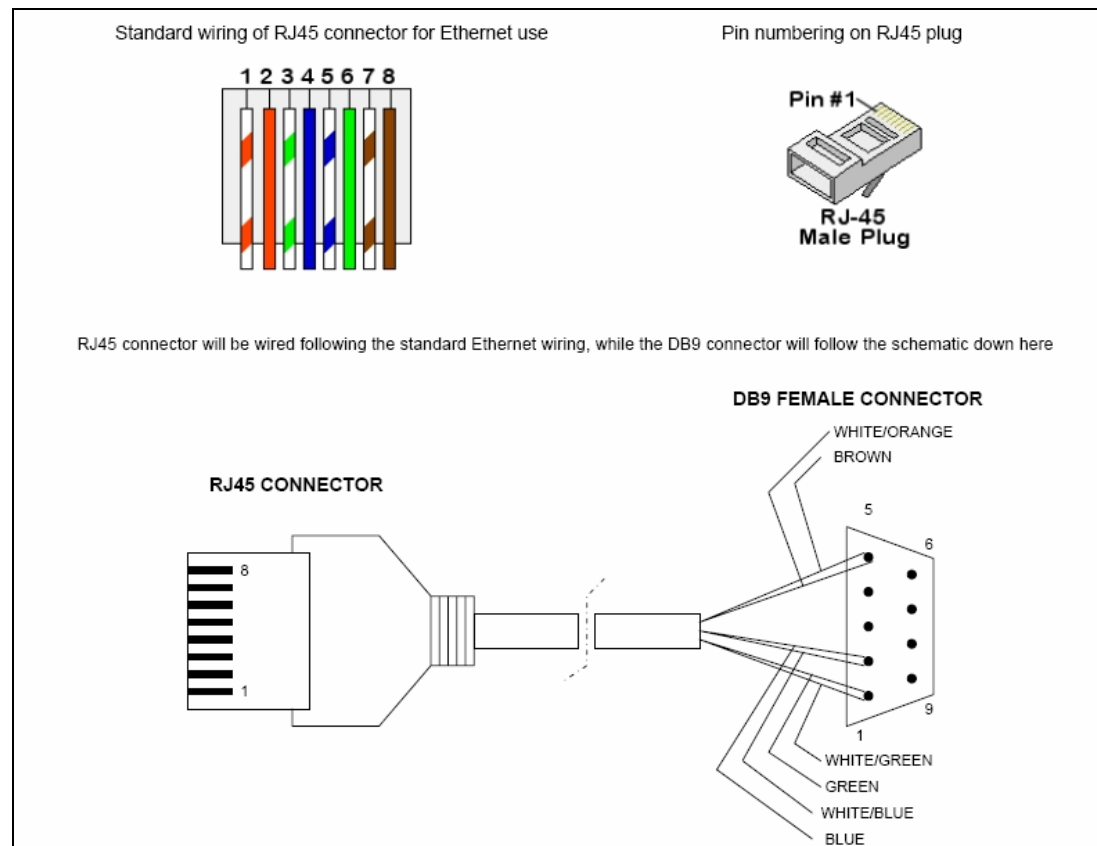
Signal input, data port and indicators

A separate rear panel provides a male and female pair of XLR connectors for analogue signal input and link, an RJ45 socket for RS485 programming and control, two rotary switches for setting the 2-digit RS485 address and seven function indicators – see below.



Signal input, control and indicator panel

Recommended DB9-to-RJ45 data cable wiring



Indicator functions

PROTECT	The system is self-protecting against external faults (e.g. mains over voltage) and internal faults (e.g. driver malfunction)
LIMIT	A user set limit or internal fixed limit has been exceeded
SIGNAL	An input signal has been detected
E-SAVE	The system is in power-saving mode – no input detected for approx. 1min
TEMP	The system is running too hot and has reduced level to lower temperature
READY	The system is powered and ready for use
ON	Mains power is present

4 Acoustical safety



Minimum audience/staff distance

Please be aware that the ASX ultra high performance active subwoofer has been designed for use in large scale installations. The ASX is capable of producing a sound pressure level of 152dB at 1m from its grille when driven to full power.

Sound pressure in excess of 140dB spl – however short the exposure time - may cause permanent hearing damage. A minimum listener distance of **4m** for audience or staff is strongly recommended.

Maximum pk spl limiters

Where a minimum listener distance of at least 4m is not feasible, we recommend limiting the maximum peak sound pressure level by loading an ASX preset with the appropriate peak limiter reduction.

System limiters should be set by an experienced sound system engineer.

Preset pk limiter reduction	Maximum spl at 1m	Safe listening distance for single peak
0dB (as shipped)	152dB peak spl	4m
-6dB presets	146dB peak spl	2m
-12db presets	140dB peak spl	1m

Note that the minimum listening distances quoted in this section are to protect the listener from single instances of maximum peak output only.

If in doubt, please email info@martin-audio.com for further advice.

5 Introduction

The Martin Audio ASX subwoofer is a revolution in ultra-efficient, low frequency sound reproduction – achieving the highest ever SPL from a single low frequency enclosure housing a single drive unit.

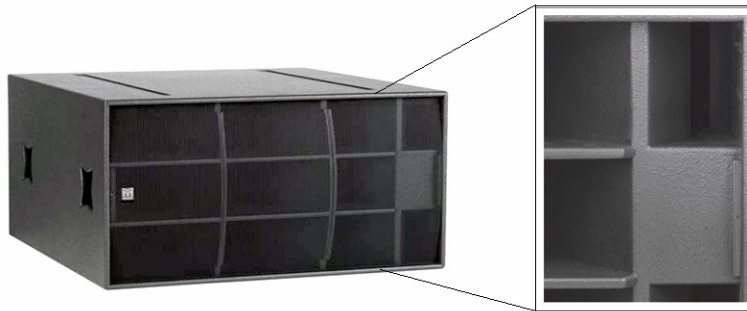
At the heart of the ASX is a unique, patented* 21" (530mm) transducer/Class D amplifier/DSP combination which provide double the output capability of a conventionally driven loudspeaker driver of the same size. When incorporated into a Martin Audio Hybrid® horn design, the complete system can deliver an unsurpassed 152dB peak output (measured) from a single enclosure.

This is typically greater than can be achieved by two 2 x 18" (460mm) conventionally driven, reflex subwoofers.

Additionally, the adaptive control loop technology maintains linearity up to the maximum output level and power compression is virtually eliminated. The dynamic, low distortion sonic signature of the ASX at full power is a revelation.

Hybrid® horn

Martin Audio's trademark Hybrid® horn design marries the very high efficiency of a large folded horn with the low frequency extension of a bass reflex enclosure.



With a path length of 2.13 metres (7ft), the horn dominates the output down to 40Hz. The reflex ports take over below the horn cut-off frequency, extending output down to 30Hz. The Hybrid® design maximises both the efficiency and bandwidth within the practical limits of enclosure size and has the fast transient performance long associated with Martin Audio bass horns.

The chamber housing the 21" (530mm) transducer is ported to the front of the enclosure, with special attention given to the cross-section profile of the ports to equalise the air pressure at the port entry and exit and reduce the air velocity at the inner and outer port edges to reduce air noise. The port profile also minimises the acoustic resistance to maximise the output from the ports.

Extensive bracing is employed throughout the 18mm birch ply enclosure and aluminium U-channel bracing is incorporated into the access door to resist the unusually high pressures generated within the driver chamber.

The ASX is ground stackable in letterbox orientation, with interlocking skids. Handles and removable castors assist positioning during installation.

IPAL (Integrated Powered Adaptive Loudspeaker)

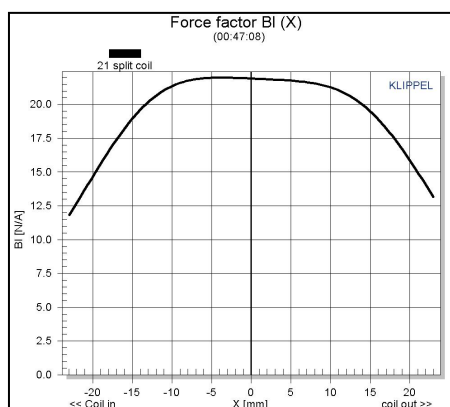
The IPAL principle maximises the efficiency of electro-acoustic conversion of a transducer i.e. the way in which the mains input power is converted into actual acoustic output. Traditional transducer design is compromised by the need to present an amplifier with a load impedance that is as resistive as possible – which implies a loss of efficiency of the transducer and also sets a limit on the current in the voice coil because of thermal dissipation.

A transducer that would minimise the voice coil resistance, maximise the BL “force factor”, or that would present a more reactive load, would enable a significant increase in the conversion efficiency.

In the practical embodiment of the IPAL principle in the ASX, DSP controlled, active feedback topology “emulates” an ideal virtual “target” transducer to maximise efficiency and maintain linearity at maximum excursion. Distortion is reduced by up to 20dB and power compression virtually eliminated.

The IPAL system in the ASX comprises a dedicated Class D amplifier module, a DSP system, a 21" (530mm) transducer unlike any other and a differential pressure sensor.

The drive unit



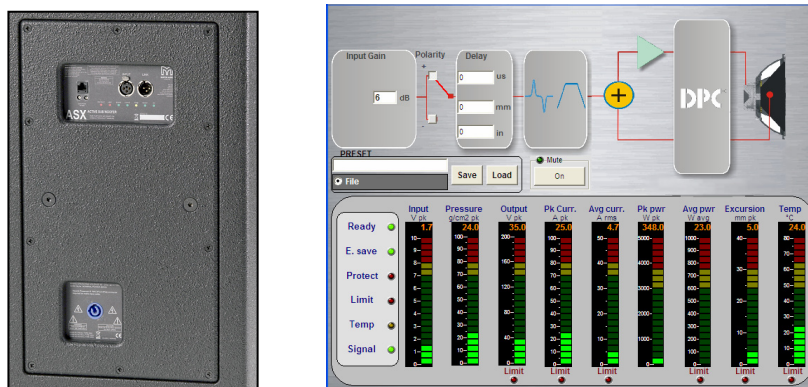
A neodymium motor system of immense proportions, coupled with a voice coil impedance of less than one ohm enables the drive unit to generate an unprecedented force upon the air load presented by the enclosure. This ability dominates the rest of the driver's electro-acoustic parameters thus creating the “virtual transducer”.

By adjusting the processing in the control loop, fixed parameters such as moving mass, resonant frequency and even cone area can be “virtually” adjusted and optimised.

To handle the unprecedented forces and resultant air pressures requires an extremely strong cone material. Made from a mix of cellulose and carbon fibres, the cone has excellent strength when in tension and compression – unlike woven aramid fibre cones, whose compressive strength is much lower than their tensile capabilities.

Amplification and DSP

The efficient Class D amplifier topology in the ASX is capable of delivering a peak power of 8.5kW and dramatically reduces the amount of energy dissipated as heat, as well as being much smaller and lighter than other amplifier topologies.



The switch mode power supply, with Power Factor Correction for worldwide operation, has very high voltage rails which can also provide high levels of current into the very low impedance of the 21" (530mm) drive unit. The DSP system is programmed with a number of parameters which represent the model of the ideal "target" loudspeaker. The actual audio input signal is then processed, so that the real loudspeaker emulates this ideal target at all power levels.



A differential pressure sensor is mounted close to the transducer and is part of a feedback loop which generates an error signal feeding the DSP system to compensate for the non linearity's of the acoustical load and of the transducer.

Firmware upgrades and DSP programming are performed using a PC via a single RS485 port on the rear of the enclosure. Martin Audio Control Manager software is available to configure the onboard DSP to provide system delay, EQ and filtering and level limiting.

Feature summary

General

- ✚ Hybrid® horn/reflex loaded installation subwoofer
- ✚ 152dB max measured output at 1m in half space.
(See important cautions regarding minimum audience distance – section 4)
- ✚ Almost non-existent power compression
- ✚ IPAL 21" ultra low impedance driver
- ✚ High efficiency class D amplifier

DSP control

- ✚ Virtual transducer parameters
- ✚ DPC® pressure sense
- ✚ Zero latency DSP feedback loop
- ✚ Compatible with Martin Audio Control Manager software

International Patents

- ✚ PCT/IT2006/000615
- ✚ PCT/IT98/00031
- ✚ US 6,281,767 B1

6 Specifications & dimensions

Acoustical

TYPE	Hybrid® horn/reflex active subwoofer
FREQUENCY RESPONSE (1)	30-150Hz \pm 3dB
MAXIMUM PEAK SPL (2)	152dB
RECOMMENDED Crossover	60-120Hz

Driver

TYPE	21" (530mm) diameter/ 6" (150mm) voice coil
PEAK DISPLACEMENT	\pm 1.2" (30 mm)
MECHANICAL DAMAGE LIMIT	\pm 1.5" (38mm)
RATED POWER	2500W AES, 10000W peak

Audio input

CONNECTORS	Female XLR input, male XLR link output
INPUT IMPEDANCE	10k Ω , balanced to ground
NOMINAL SYSTEM GAIN	32dB
INPUT LEVEL FOR MAX SPL	3.5V rms (+13dBu)
S/N RATIO	>105dB
DISTORTION (100Hz)	<0.05%

Amplifier module

TYPE	Single channel switchmode, fixed frequency
PK-PK OUTPUT VOLTAGE	390V
PK-PK OUTPUT CURRENT	200A
AVERAGE EFFICIENCY	85%
PEAK OUTPUT POWER	8500W
COOLING	2 x temperature controlled, variable speed fans 1 x forced air blower, venting in to horn mouth

Power supply

TYPE	Switch mode, fixed frequency with PFC
AC INPUT OPERATING RANGE	85V AC – 270V AC, 50/60Hz
AC OVERVOLTAGE TOLERANCE	400V AC
POWER FACTOR	> 0.95
NOMINAL POWER CONSUMPTION	400VA
MAINS CONNECTOR	Neutrik® Powercon®

DSP control input

RS485 PORT	RJ45 socket
------------	-------------

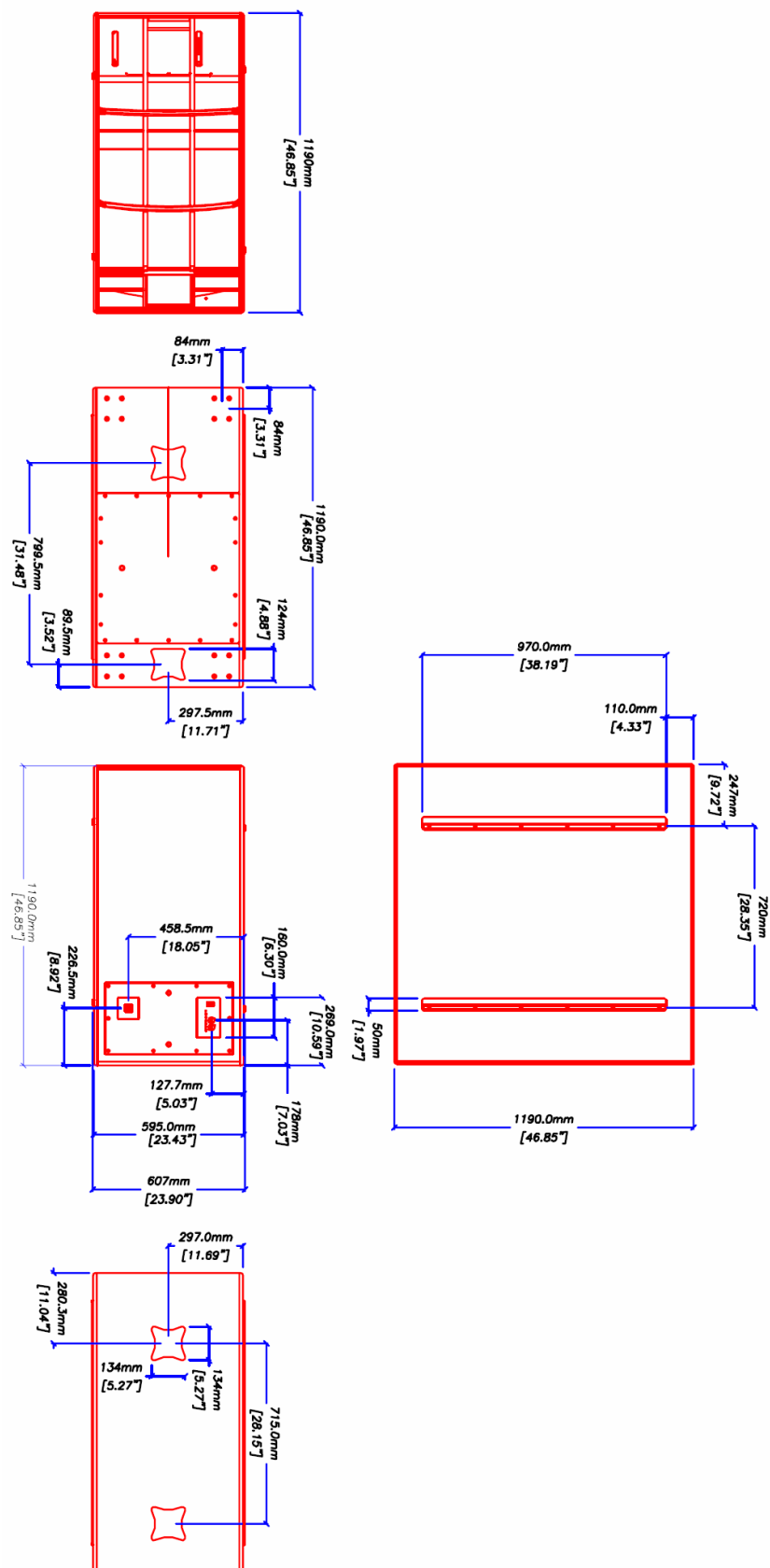
GENERAL

ENCLOSURE	Extensively braced, multi-laminate birch ply
FINISH	Black textured paint
PROTECTIVE GRILLE	Perforated steel
FITTINGS	2 pocket handles on each side, 2 wooden skids on top and bottom, 4 removable castors for transportation
INSTALL DIMENSIONS	(W) 1200mm x (H) 600mm x (D) 1200mm
(see next page)	(W) 47.24ins x (H) 23.62ins x (D) 47.24ins
DIMENSIONS	(W) 1328mm x (H) 600mm x (D) 1200mm
(INC. WHEELS)	(W) 52.28ins x (H) 23.62ins x (D) 47.24ins
WEIGHT	160kg (353lbs)

Notes:

1. Measured in half-space
2. Measured in half-space at 1 metre with band-limited pink noise

Dimensions



7 System set-up with MA Control Manager

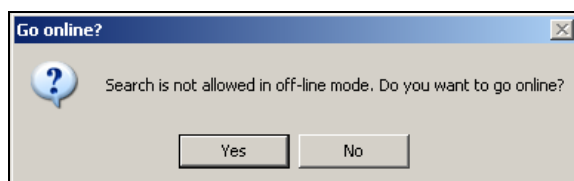
MA Control Manager software (v2.2.22 or later) is available from your Martin Audio User Guides CD or from the **Downloads** section of www.martin-audio.com.

Please refer to the MA Control Manager/RS485 users' guide (January 2009) to familiarise yourself with MA Control Manager.

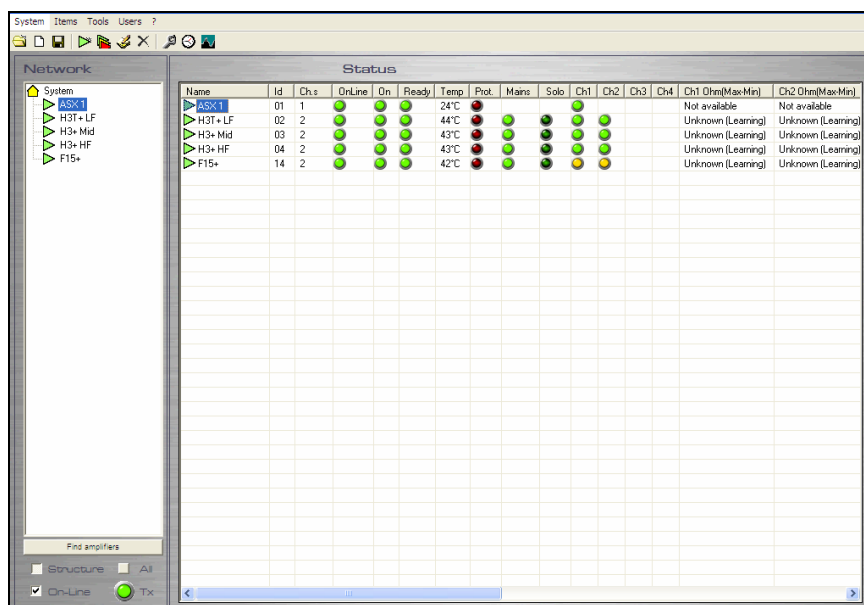
- 1) Ensure that you have set the ASX rear panel address switches (section 3) to a suitable 2-digit address – i.e. one that is not used by any other device on the RS485 daisy-chain address 01 shown
- 2) Ensure that the end of your RS485 daisy-chain is terminated correctly (usually with a 120 ohm resistor) to avoid potential data corruption
- 3) It is best to mute any audio signal to the ASX during the set-up
- 4) Apply power to the ASX and wait a moment for the rear panel **Ready** led to come on
- 5) Connecting the RS485 cable “live” may cause low level clicks to be heard from the ASX. This is quite normal
- 6) Boot up the MA Control Manager software and press the **Find amplifiers** button in the bottom left of the window.



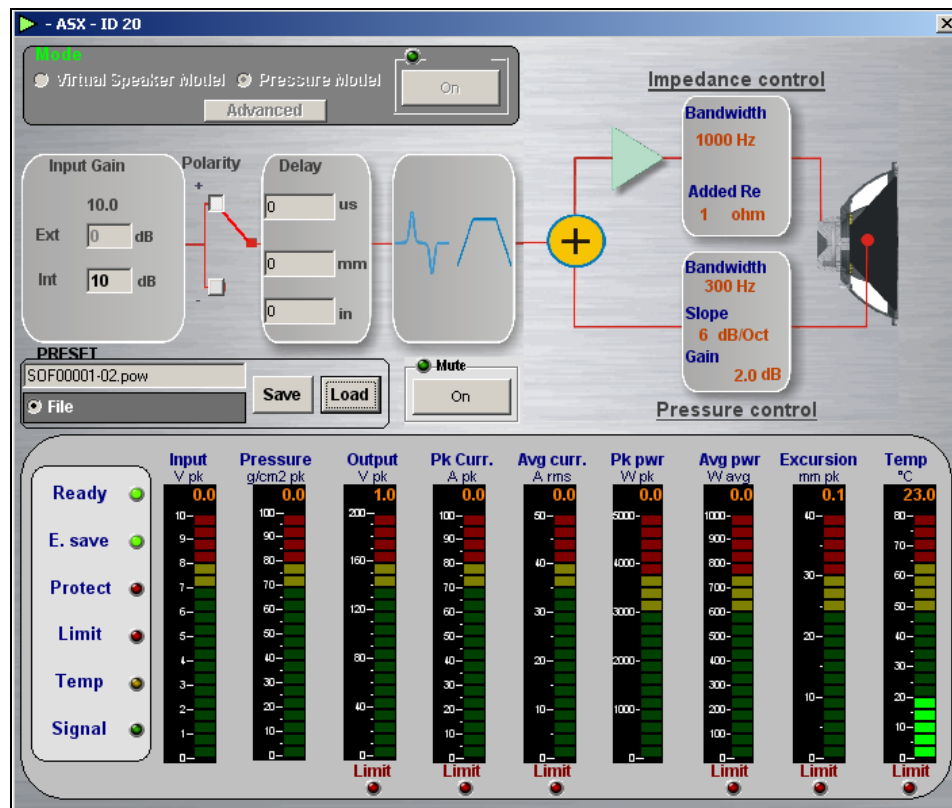
- 7) You will get the following message, click on yes



- 8) The software will automatically detect all amplifiers on the RS485 network. Ensure that all the ASX and Martin Audio K-Series amplifiers have been found



- 9) Double-click on the appropriate ASX title (either in the **Network** or in the **Status** column) – highlighted in blue in the above illustration – to open a detailed control window for the selected ASX

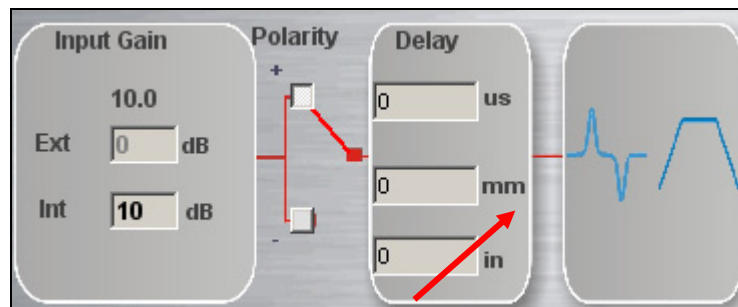


- 10) Click on the **Load** button in the PRESET area and browse to select the appropriate preset for your ASX/main system combination.

A variety of ASX presets are available from your Martin Audio User Guides CD or from the Downloads section of www.martin-audio.com. These can be copied and pasted to a suitable place on your pc if you are a regular system installer. Most system can be set up using the default preset (pre loaded) and simply setting the crossover point and any bass boost/cut.

Advanced Software Tools

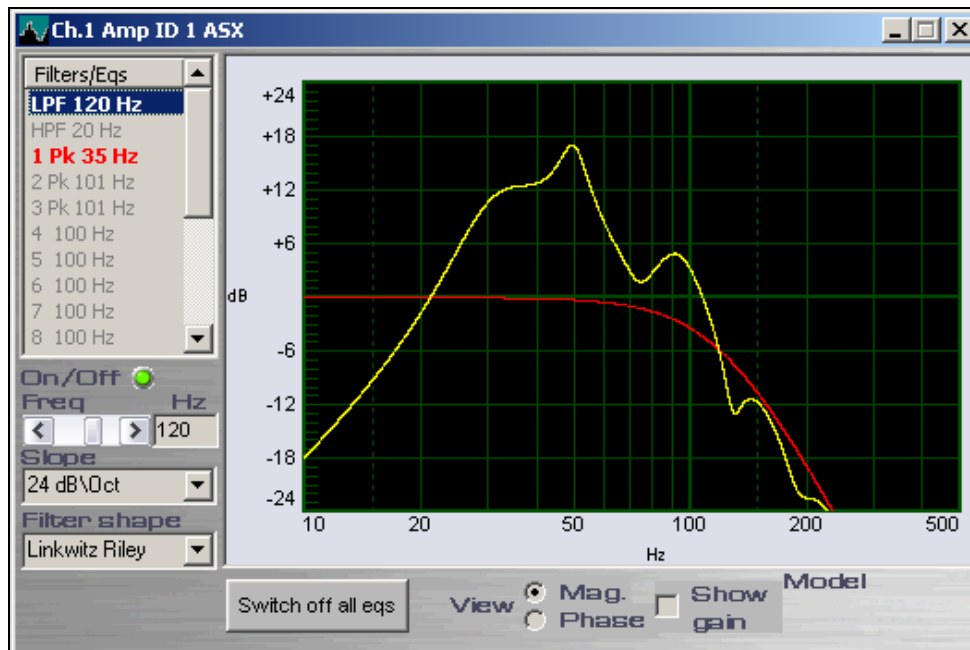
The ASX contains a full DSP system. In the ASX control window you can set internal gain, polarity and delay by entering the required values. PEQ filters and crossover points can also be set but this requires a password since the EQ contain vital 'system EQ' see below for explanation. To set filters and crossover points double click on the panel arrowed below.



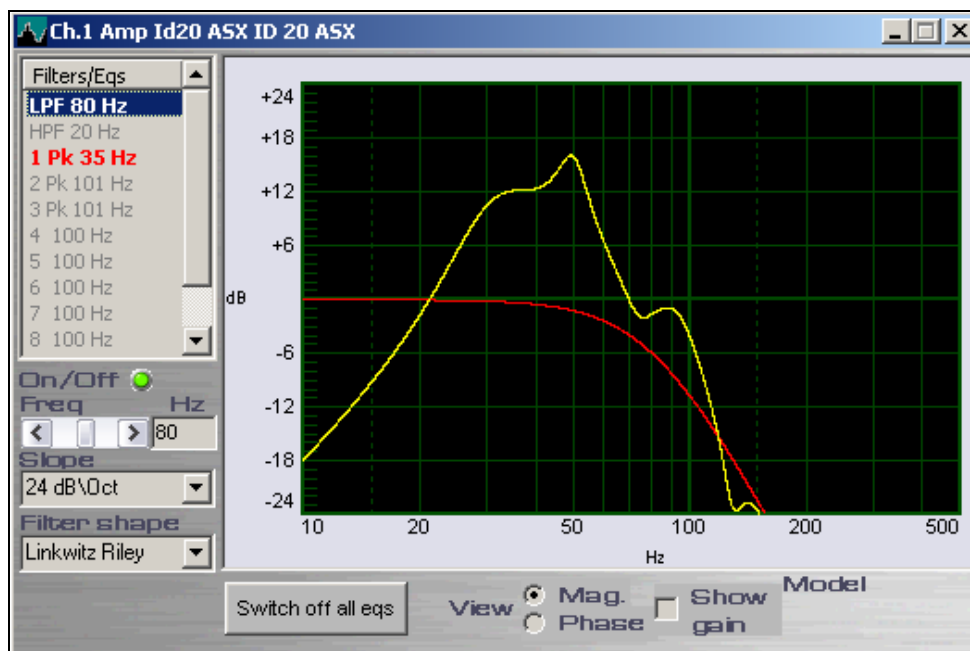
You will see the filter window below. The yellow line shows the 'system EQ' and any high pass / low pass / PEQ filters that are added. Below are the factory settings.

Don't be alarmed by the 'system EQ'! The ASX uses a servo assisted current drive system that results in an almost flat current response but a varying voltage response. The 'system EQ' makes the voltage response and resulting acoustical response flat. The 'system EQ' does not, therefore, limit voltage head room.

Now that the system has been made flat, any additional filters will give the correct output. In the case below this is an exact 120Hz 24dB/Oct Linkwitz Riley Low pass.



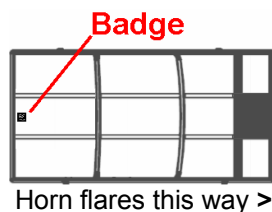
To change the low pass to the correct point for your system, enter a new value in the **Freq Hz** box, use the drop down menus to change slope and filter type. In addition PEQ's can be entered. Click on a line in the Filters/Eqs menu and it will highlight. Enter additional filter values or PEQ values. Below shows a LR 24 lowpass at 80 Hz, with a PEQ peak at 35 Hz, this would be a typical setting.



8 System placement

Horizontal orientation

ASX horns flare from the badge end to allow ASXs to be paired to create one large bass horn.



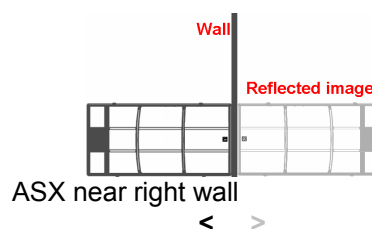
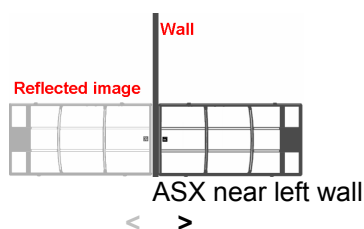
Basic stereo placement

The horn flare asymmetry is usually insignificant when ASXs are used as single units well away from boundaries. However, purists may wish to place stereo subs in mirror image to ensure L-R symmetry.



Side wall effects

ASXs will act like one double-sized horn if placed near solid side walls.



Do not rely on this effect unless the walls are very rigid. Thin/flexible partition walls will resonate resulting in low frequency colouration and, possibly, significant absorption at some frequencies.

Multiple ASX coupling

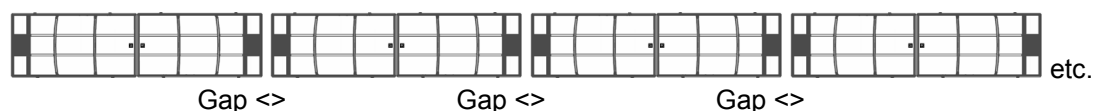
ASXs may be symmetrically coupled by placing them badge-to-badge.



High power Left-Centre-Right system



Planar arrays for mega clubs



Horizontal planar arrays of ASX pairs give very smooth coverage, especially where ASX-to-ASX gaps can be minimised.

For the ultimate high power coverage consistency, ensure that the gaps are no larger than shown below for various ASX operating bandwidths.

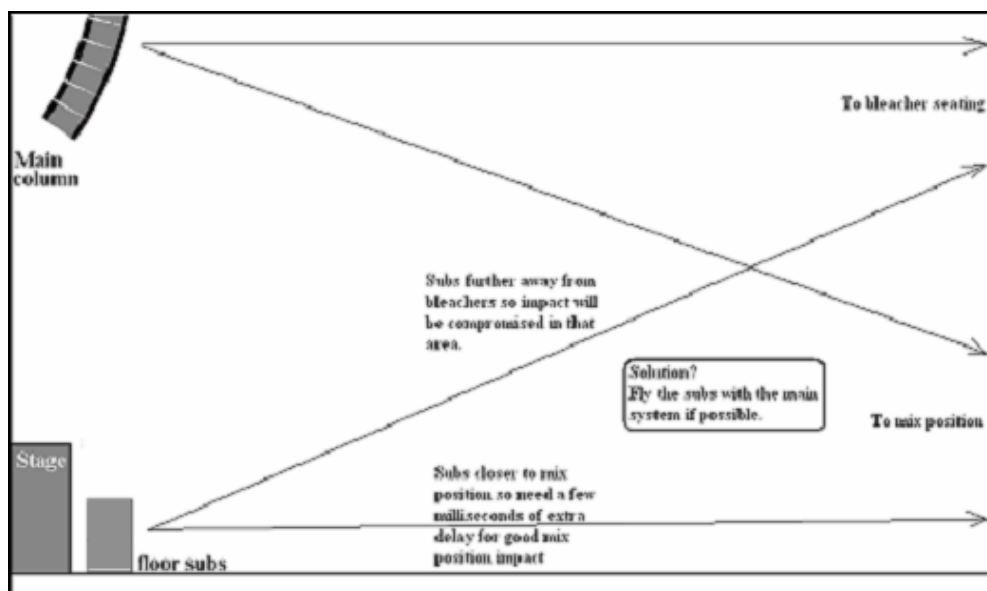
Gap	Smooth coverage range
0.6m	>160Hz
1.2m	>115Hz
2.4m	>86Hz
4.8m	>60Hz

9 System time/phase alignment

ASX systems should be placed with the subwoofer and main sound system grilles vertically aligned wherever possible.

ASX grilles and main system grilles should be closely aligned so that they are at equal distances from a central audience area – preferably a well positioned mix or reference position. If systems need to be physically misaligned for structural reasons, extra delay may be employed to compensate for the differing arrival times.

Note that electronic delay can only compensate for physical misalignment with reference to a specific listening area - usually a listening reference point eg the mix position. In the following example, aligning for maximum impact at the mix position will compromise bleacher impact and vice versa.



ASX sub-woofers may be time aligned without special test gear as follows:

- 1) Start ASX loaded with the standard presets for the system combination in use (see www.martin-audio.com web site for the latest ASX presets).
- 2) Use a laser tape measure to measure the distance to the main system grille and the ASX sub-woofer grille.
- 3) If the ASX sub-woofers are closer than the main “top” system, increase the ASX output delay via the RS485 port using the Control Manager software. Increase by 2.91ms for every metre of misalignment.
- 4) If the main (top) system is closer than the ASX sub-woofers, increase the main system delay using its controller input channel. Again, increase the delay by 2.91ms for every metre of misalignment.
- 5) Fine adjust the delay by switching the ASX sub-woofers to reverse polarity, listening to narrow band noise in the crossover region and adjusting the delay for a dip in level.
(Note: You MUST complete steps 1-3 before fine tuning!)
- 6) **Don't forget to switch the ASX sub-woofers back to normal polarity for maximum summation and impact!**

10 Warranties

ASX cabinet, fittings and cone driver

Martin Audio ASX cabinets, fittings and cone drivers are warranted against manufacturing defects in materials or craftsmanship over a period of 5 years from the date of original purchase.

During the warranty period Martin Audio will, at its discretion, either repair or replace products which prove to be defective provided that the product is returned in its original packaging, shipping prepaid, to an authorised Martin Audio service agent or distributor.

Martin Audio Ltd. cannot be held responsible for defects caused by unauthorised modifications, improper use, negligence, exposure to inclement weather conditions, act of God or accident, or any use of this product that is not in accordance with the instructions provided by Martin Audio.

Martin Audio is not liable for consequential damages. This warranty is exclusive and no other warranty is expressed or implied. This warranty does not affect your statutory rights.

ASX power module

Martin Audio power modules are warranted against manufacturing defects in materials or craftsmanship over a period of 1 year from the date of original purchase.

During the warranty period Martin Audio will, at its discretion, either repair or replace products which prove to be defective provided that the product is returned in its original packaging, shipping prepaid, to an authorised Martin Audio service agent or distributor.

Martin Audio Ltd. cannot be held responsible for defects caused by unauthorised modifications, improper use, negligence, exposure to inclement weather conditions, act of God or accident, or any use of this product that is not in accordance with the instructions provided by Martin Audio.

Martin Audio is not liable for consequential damages. This warranty is exclusive and no other warranty is expressed or implied. This warranty does not affect your statutory rights.